

A Revision of the family Philopotamidae from Japan

(Trichoptera : Insecta)

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カワトビケラ科の再検討

カワトビケラ科は昆虫綱毛翅目に属する多くの種を含む1科で、世界的に広く分布をしている。わが国でも多くの種が知られている。1956年に Ross によって、わが国からの既知種も含めて、カワトビケラ科の再検討がおこなわれた。その後、わが国に生息する毛翅目の分類学的研究の過程において、カワトビケラ科について再検討をする必要が生じたので、ここに再検討を試みるとともに1新属12新種の記載をおこなった。(小林峯生)

The Philopotamidae are world-wide in distribution, and are abundant in rapid, clean stream from subarctic to tropical areas. The adults vary considerably in size and shape. The smallest are 3 or 4 mm. long and drab in color. These external features offer little aid in grouping the species into natural units. The best criteria for this have proven to be differences in wing venation and male genitalia. As was pointed out by ULMER (1930) and ROSS (1956), the Philopotamidae contain three principal groups, based on the shape of the anal veins in the hind wing.

The *Sortosa* complex, whose members have all three anal veins present (Pl. 1, 2), including a few with the second (2A) represented by only a stud.

The *Chimarra* complex, in which 2A is couped up and fused with 1A to form a loop at the base of 1A (Pl. 1, fig. 1).

The *Wormaldia* complex, in which all trace of 2A has disappeared, so that the anal veins give the appearance of a divergent fork (Pl. 1, fig. 11).

In the course of the study on the Japanese Trichoptera, I found undescribed many species belong to Philopotamidae. In this paper, 1 genus and 12 species are newly described, give keys to the species. Among the known species 2 species were not examined because the material of those species were not available. Those are *Chimarra concolor* ULMER 1915, *Wormaldia kisoensis* (TSUDA) 1942.

I wish to express my gratitude to Dr. Kintaro BABA, Mr. Sigikazu UCHIDA, Mr. Kōtaro SHIRAHATA, and Mr. Hisashi KADOWAKI, who allowed me to study the specimens collected by them.

Fam. **Philopotamidae** WALLENGREN, 1891Type genus; *Philopotamus* STEPHENS 1829

Philopotamidae WALLENGREN, 1891, K. Sv. Vet. Akad. Handle., 24 (10); 143

- Philopotamidae: ULMER, 1907, Gen. Insect., 60a; 195
 Philopotamidae: BETTEN, 1934, Bull. N. Y. State Museum., 292: 164
 Philopotamidae: TSUDA, 1942, Mem. Coll. Sci. Kyoto Imp. Univ. (B), 17; 255
 Philopotamidae: ROSS, 1944, Bull. Ill. Nat. Hist. Surv., 23; 44
 Philopotamidae: MOSELY & KIMMINS, 1953, Trichoptera., Australia and New Zelend.
 British Mus.; 285
 Philopotamidae: ROSS, 1956, Evolution and classification on the mountain caddis-
 flies. Urbana; 52

Diagnosis: Spurs 2, 4, 4 or 1, 4, 4. Ocelli present. Maxillary palpi with the first joint always short; terminal joint fairly long and articulated; the intermediate joints varying according to genus. Apical forks nos. 1, 2, 3, 4 and 5 or 1, 2, 3 and 5 present in front wing. Discoidal cell always present in both wings. Additional costal cross-vein and generally an addition oblique cross-vein between Sc and R in front wing.

Key to Genera

1. Hind wing with 2A curved up and fusing with 1A to form large loop (Pl. 1 fig. 1); front tibiae with one apical spur *Chimarra* STEPHENS
- Hind wing with 2A with apex free (Pl. 1, fig. 2) or absent; front tibiae with two apical spurs 2
2. Hind wing with veins 2A atrophied beyond cross-veins A2 (Pl. 1, fig. 11) *Wormaldia* Mc LACHLAN
- Hind wing with veins 2A extending beyond cross-veins A2 (Pl. 1, fig. 2) *Sortosa* NAVAS

Genus *Chimarra* STEPHENS 1820

Type species: *Phryganea marginata* LINNE 1815

- Chimarra* STEPHENS, 1829, Syst. Cat. Brit. Ins.; 318
Chimarra: CURTIS, 1835, Brit. Ent., pl. 61
Chimarrha: BURMEISTER, 1839, Handb. Ent. 2; 910
Chimarrha: ULMER, 1907, Gen. Insect. 60a; 199
Chimarrha: BETTEN, 1934, New York State Mus. Bull., 292; 171
Chimarrha: TSUDA, 1942, Men. Coll. Sci. Kyoto Imp. Univ. (B), 17; 256
Chimarra: MOSELY & KIMMINS, 1953, British Mus. (Nat. Hist.), London; 398
Chimarra: ROSS, 1956, Evoulution and classification of the mountain caddisflies. Urbana; 52

Diagnosis: Antennae much shorter than the wings, widely separated at the point of insertion. Basal joint short and stout, not so long the head. Maxillary palpi long and thick. First joint very short, second and third very long, the second longer than the third and with a tuft of bristle-like hairs at its apex; fourth triangular and very short; fifith longer than the fourth and slightly shorter than the third.

Wings long and narrow, front with the costal and anal margins nearly parallel. Pubescence slight; generally there is a large, shining, nude space below the sector just before it furcates. Apical forks nos. 1, 2, 3, 4 and 5 present in front wings. Hind wings scarcely broader than the front. Apical forks nos. 1, 2, 3 and 5 generally present. Spurs count 1-4-4. This genus is set off from all others in the family by the fusion of 2A with 1A in the hind wing to form a large closed cell. The claspers are composed of a single segment.

Distribution: Equatoria, Argentina, Peru, Japan.

Two species which belong to the genus *Chimarra* have been recorded from Japan.

Key to species

1. The lobes of the tenth tergite capitate-shaped..... *tsudai*
- . The lobes of the tenth tergite not capitate-shaped..... *concolor*

Chimarra concolor ULMER 1905

Chimarrha concolor ULMER, 1905, Steet. Zeitg., 66; 97

Chimarrha concolor: ULMER, 1906, Not. Leyden Mus., 28; 96

Chimarrha concolor: ULMER, 1911, Deutsch. Ent. Zeitschr., 4; 396

Chimarrha concolor: ULMER, 1930, Trebuia, 11; 420

Chimarrha concolor: TSUDA, 1939, Annot. Zool. Japonenses, 18; 295

Chimarrha concolor: TSUDA, 1942, Mem. Coll. Sci. Kyoto Imp. Univ., (B), 17; 256

Chimarra concolor: ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana; 72

The original description of this species was based upon both sexes from Sumatara. The first record of this species from Japan was described by TSUDA (1942). But I had no chance to examine this species. ULMER (1905) described the species as follows.

“Kopf schwarz, Fühler dunkelbraun, schmal heller geringelt; Kiefertaster schwärzlich, wie die der vorigen Art gebaut. Brust und Hinterleib schwarz; letzterer an den Seiten mehr bräunlich, am Ende gelb oder braun. Beine braun, Hüften und Schenkel dunkelbraun; Sporne 1, 4, 4; Sporn der Vordertibie schon mit Lupe zu sehen; Sporne innerhalb der Paare fast gleich. Flügel subhyalin, mit kurzer, anliegender, spärlicher gelbbrauner Behaarung; Adern dunkelbraun, nur 4 Queradern (eine verbindet die Discoidalzelle mit dem Stiel der dritten Endgabel, die zweite schließt die Medianzell die dritte schließt die Thyridiumzelle, und die vierte befindet sich am Arculus) im Vorderflügel hyalin; die Flügel irisieren. Im Vorderflügel ist der Stiel der Discoidalzell sehr stark gekrümmt; die Thyridiumzell ist der Medianzell sehr ähnlich; im Hinterflügel ist auch Gabel 5 kurz gestielt; keine nackte Zelle im Vorderflügel. — Das Hinterleibsende des ♀ ist lang und spitz ausgezogen. Die Anhänge des ♂ sind wegen der Flügellage in dem Objekte nicht deutlich erkennbar; die unteren Auhänge sind dreieckig zugespitzt (Ventralansicht), viel breiter als bei

Chimarrha marginata LINNE

Körperlänge 4 bis 5 mm, Länge des Vorderflügels; 6 bis 7 mm; ♀ größer als ♂.
Distribution: Sumatra, Java, Japan (Kyoto Prefecture)

Chimarra tsudai ROSS 1956

(Pl. 1, fig. 1, & Pl. 2, figs. 1-3)

Chimarra tsudai ROSS, 1956, Evolution and classification of the mountain caddisflies, Urbana.; 71

Male: Length 7 mm. Color medium shaded of brown, the venter lighter. General structure typical for genus. Genitalia as in Figs. Ninth segment with lateral and ventral portions moderately long, the venter with a long but shallow keel. Tenth tergite with central membranous portion apparently atrophied; there are two pairs of lateral lobes, an outer lobe which is wide-set, constricted at the base, then tapering to apex, the whole covered with sensillae; arising from the inner side of the base of each of these lobes is a short, curved, capitate process. This process appears to be connected jointly to the bottom of the tenth tergite lobe. Clasper long, the lateral aspect thin, with to blunt teeth at apex, the ventral aspect parallel-sided, having to pairs of sclerotized rods which are slender and of moderate length.

This species belongs to the *concolor* group but differs from *concolor* in the shape of lobes of the tenth tergite.

Specimens examined: 4 ♂♂ 1 ♀, Ochiai, Arakawa-mura, Chichibu, Saitama Pref., Aug. 16, 1954 (M. KOBAYASHI); 5 ♂♂, Hayakawa, Hakone-machi, Kanagawa Pref., May 12, 1967 (M. KOBAYASHI); 3 ♂♂, same locality, Sept. 4, 1968 (M. KOBAYASHI); 2 ♂♂, Kamiange, Hachioji-shi, Tokyo, May 31, 1973 (M. KOBAYASHI); 1 ♂, Dintyu, Fujino-machi, Kanagawa Pref., June 16, 1973 (M. KOBAYASHI); 1 ♂, Nozawa, Yusa-machi, Yamagata Pref., May 24, 1977 (K. SHIRAHATA); 5 ♂♂, Tainozawa, Yamakita-machi, Kanagawa Pref., May 30, 1979 (S. UCHIDA); 2 ♂♂, Yakurazawa, Minami-ashigara-shi, Kanagawa Pref., April 15, 1979 (S. UCHIDA).

Distribution: Sumatra, Java, Formosa, Japan (Nagano, Kanagawa, Saitama Yamagata Prefectures).

Genus **Sortosa** NAVAS 1918

Type species: *Sortosa fusca* NAVAS, 1918

Sortosa NAVAS, 1918, Bol. Soc. Aragon, 17; 227

Sortosa: LESTAGE, 1925, Bull. Ann. Soc. ent. Belg., 65; 35

Sortosa: ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana.; 29

Diagnosis: Antennae somewhat shorter than anterior wings. In the maxillary palpi the basal joint is short, second still shorter and globular in form, third longer

than the first and second together, fourth about as long as the first and second together, fifth about as long as the first and fourth together. Front wings moderately broad; hairy clothing sort and dense; discoidal cell closed, short, a cross-vein uniting the costa and subcosta towards the center of the costal area, another the subcosta and radius, and the radius is united to the radial sector by a cross-vein meeting it towards the distal end of the discoidal cell, apical forks nos. 2, 3, 4 and 5 present. In hind wings forks nos. 2, 3 and 5 and three anal veins are present, and there are cross-veins uniting the subcosta and radius and the radius with its sector as in the front wings. Spurs count 2-4-4. Clasper two-segmented, the apical segment unbranched.

This genus *Sortosa* found in Japan has been divided by ROOS (1956) into two subgenera *Kisaur* and *Dolophilodes*, and I describes the new subgenus. There have been recorded five species of this genus from Japan.

Key to subgenera

1. Male genitalia with simple, 2-segment clasper; clasper without mesoventral plate between the two segments2
- Male genitalia with a pair of long process between the tenth tergite and cerci; clasper simple, 2-segmented, with mesoventral plate developed between the two claspers*Kisaura* ROSS
2. Tenth tergite cleft narrow *Dolophilodes* ULMER
- Tenth tergite without cleft *Hisaura* new subgenus

Subgenus *Kisaura* ROSS 1956

Type species: *Sortosa obrussa* ROSS, 1956

Kisaura ROSS, 1956, Evolution and classification on the mountain caddisflies. Urbana.; 57

Diagnosis: Front and hind wings with primitive venation except R which is variable; it may be near on considerably beyond s, or may be atrophied. Male genitalia with a pair of long processes between the tenth tergite and cerci; clasper simple.

Distribution: Asia.

Key to species

1. Lateral processes of tenth tergite shorter than median lobe of tenth; lateral aspect of basal segment of clasper nearly rectangular.....*niitakaensis*
- Lateral processes of tenth tergite same length as median lobe of tenth; lateral aspect of basal segment of clasper nearly ovoid*kisoensis*

Sortosa (*Kisaura*) *kisoensis* (T_{SUDA}) 1939

(Pl. 1. fig. 2, & Pl. 2, figs. 4-6)

Dolophilodes kisoensis T_{SUDA}, 1939, Annot. Zool. Japonenes, 15; 396

Dolophilodes kisoensis: TSUDA, 1942, Mem. Coll. Sci. Kyoto Imp. Univ., (B), 17; 255

Kisaura kisoensis: KOBAYASHI, 1964, Bull. Nat. Sci. Mus., (Tokyo), 7; 86

Kisaura kisoensis: KOBAYASHI, 1971, Res. Rep. Kanagawa Pref. Mus. (Nat. Hist.), 3; 22

Sortosa kisoensis: KOBAYASHI, 1973, Bull. Kanagawa Pref. Mus. (Nat. Hist.), 6; 30

Male: Length 6 mm. Color various shades of brown, the venter lighter. Front wings with complete venation, and with R_{2+3} branched beyond s a distance about equal to length of s . Male genitalia as in figs. Ninth segment deep but moderately long. Tenth segment much longer, with its central portion membranous at the base, the apex lightly sclerotized and divided into a pair of closely appressed halves. A long sclerotized process arises on each side where the base of the tenth tergite joints the ninth segment. The cerci are about half as long as the tenth tergite and arise from the base of the tenth. They bear a scattering of setae on the apical portion. Clasper with basal segment short and irregular; apical segment considerably longer, slender, and bearing on the mesal surface a straight comb of black, sclerotized teeth. Aedeagus moderately elongate and cylindrical, with membranous apex.

Specimens examined: 1♂, Nukabira, Hokkaido, June 26, 1956 (H. OHONO); 3♂♂ Hayakawa, Hakone-machi, Kanagawa Pref., May 23, 1967 (M. KOBAYASHI); Kaeruzawa, Tsukui-machi, Kanagawa Pref., July 4, 1968 (M. KOBAYASHI); 1♂, Miwa, Yusa-machi, Yamagata Pref., Sept. 14, 1977 (K. SHIRAHATA).

Distribution: Japan (Nagano, Kanagawa, Yamagata, Hokkaido Prefectures).

***Sortosa (Kisaura) nittakaensis* KOBAYASHI 1973**

(Pl. 1, fig. 3, & Pl. 2, figs. 7-9)

Sortosa nittakaensis KOBAYASHI, 1973, Bull. Kanagawa Pref. Mus. (Nat. Hist.), 6; 29

Male: Length 5 mm. Color medium shaded of brown, the venter lighter. General structure typical for genus. Front wings with complete venation, with R_{2+3} branched midway between s and tip of wing. Male genitalia as in figs. Ninth segment fairly large, potato-shaped. Tenth tergite elongate, the lateral and ventral sclerotized portion apparently divided into two halves which are closely appressed and covered with membranous folds which unite with the sclerotized part at apex; the entire dorsal portion is membranous and this membrane unites with that of the eighth segment. On each side of the base of the tenth arise a long slender sclerotized process. The cerci are about half as long as the tenth tergite. Clasper long, irregular base; apical segment longer and shallower, and bearing on the mesal surface a straight comb of black, sclerotized teeth; the articulating process at the apex of the basal segment is small and almost hidden by the membranous folds between the segment. Aedeagus moderate by elongate and cylindrical.

Specimens examined: 1♂, Nukabira-Onsen, Hokkaido, Aug. 16, 1956 (M. KOGURE); 1♂, Himekawa-Onsen, Kotani-mura, Nagano Pref., July 26, 1964 (K. BABA); 2♂♂, Shirahone-Onsen, Kotani-mura, Nagano Pref., Aug. 5, 1964 (K. BABA); 2♂♂, Ohkura, Hatano-shi, Kanagawa Pref., July 4, 1968 (M. KOBAYASHI); 2♂♂, Akuzawa, Yamakita-machi, Kanagawa Pref., July 4, 1968 (M. KOBAYASHI); 2♂♂ 1♀, Tsukiya-mashizu, Asahi-mura, Yamagata Pref., Sept. 18, 1967 (K. SHIRAHATA); 4♂♂ 1♀, Mt. Hayachine, Iwate Pref., Aug. 4, 1969 (K. SHIRAHATA); 23♂♂ 5♀♀, Niitakayu, Mt. Azuma, Yamagata Pref., Aug. 27, 1970 (K. SHIRAHATA); 1♂, Kurokawa-mura, Kitakanbara-gun, Niigata Pref., Setp. 20, 1971 (K. BABA).

Distribution: Japan (Nagano, Kanagawa, Niigata, Yamagata, Hokkaido Prefectures)

Subgenus **Dolophilodes** ULMER 1909

Type species: *Dolophilodes ornata* ULMER, 1909

Dolophilodes ULMER, 1909, No. Leyden Mus., 31; 125

Trentonius BETTEN & MOSELH, 1940, The Francis Walker types of Trichoptera of the British Museum. London.; 11

Dolophilodes: TSUDA, 1942, Mem. Coll. Sci. Kyoto Imp. Univ. (B), 17; 255

Dolophilodes: ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana.; 58

Diagnosis: Venation complete, front wings with R_{3+3} branches close to the wing margin and distant from s. Male genitalia with simple, 2-segmented clasper and with the tenth tergite cleft; aedeagus a long and chiefly membranous sac, with one long, thin, internal sclerotized rod; cerci large.

Distribution: Asia, North America.

Key to species

1. Lobes of tenth tergite with lateral flanges, with apical points appressed, and with basal portion of segment forming a high, sharp mesal crest ending at the base of the tergal lobes; cercus large, concave laterally and ear-shaped *auriculata*
- . Lobes of tenth tergite simple, tenth with no mesal crest; cercus moderate size and not ear-shaped 2
2. Apical segment of clasper with dorsal margin concave at extreme end, the tip therefore appearing suddenly narrowed *japonica*
- . Apical segment of clasper with dorsal margin evenly concave 3
3. Front wings R_{2+3} branched 4
- . Front wings R_{2+3} unbranched 5
4. Lateral lobes of tenth segment an arrowhead-shaped *shinboensis* sp. nov.
- . Lateral lobes of tenth segment elongate, rounded at apex; basal portion of clasper with two pairs of long bristles *iroensis* sp. nov.
5. Lobes of tenth segment a triangular *babai* sp. nov.

- . Lobes of tenth segment stout, rounded at apex.....*nomugiensis* sp. nov.

Sortose (*Dolophilodes*) *auriculata* (MARTYNOV) 1933

(Pl. 1, fig. 4, & Pl. 3, figs. 1-3)

Dolophilodes auriculatus MARTYNOV, 1933, Annot. Zool. Japonenses, 14; 142

Dolophilodes auriculata: TSUDA, 1942, Mem. Coll. Sci. Kyoto Imp. Univ., (B), 17; 255

Sortosa (Dolophilodes) auriculata: ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana.; 59

Male: Length 6 mm. Color various shades of brown, the venter lighter, and front wings with dark pubescence superimposed on a uniform light brown membrane. Venation complete, with R_{2+3} branched between *s* and third from tip of wing. Male genitalia as in figers. Ninth segment are broad, but narrowed in the base. Tenth segment short, composed of two subquadrangular side portion and of one very narrow median brownish elevation. Lobes of tenth tergite with lateral flages, with apical points appressed, and with basal portion of segment forming a high, sharp mesal crest ending at the base of the tergal lobes. Cerci large, concave laterally and ear-shaped. Clasper with basal segment long; apical segment short, acuted at apex. Aedeagus a large and membranous sac, with one long, thin internal sclerotized red.

Specimens examined: 5 ♂♂, Asahi-mura, Kitakanbara-gun, Niigata Pref., Sept. 25, 1968 (M. KOBAYASHI).

Distribution: Japan (Shiga, Niigata Prefectures)

Sortose (*Dolophilodes*) *japonica* (BANKS) 1906

(Pl. 1, fig. 5, & Pl. 3, figs. 4-6)

Philopotamus japonica BANKS, 1906, Proc. Ent. Soc. Washington, 7; 11

Dolophilodes excisus MARTYNOV, 1933, Annot. Zool. Japonenses, 14; 140

Sortosa (Dolophilodes) japonica ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana.; 59

Dolophilodes japonica; KOBAYASHI, 1971, Res. Rep. Kanagawa Mus. (Nat. Hist.), 3; 21

Male: Length 6 mm. Color yellowish brown, and front wings with an irrorate pattern of lighter makings caused by light on a uniform light brown membrane. Venation complete, with R_{2+3} branched midway between *s* and tip of wing. Male genitalia as in figers. Ninth tergite with somewhat concave posterior edge; dorsal portion very narrow. Tenth segment very short, subtriangular, subdivided into two minute lobes by median narrow cleft. Cerci rounded, triangular, with tubercled inner edge, bearing erect bristles. Clasper large; basal segment broad, truncated at its broadened end; apical segment shorter than basal segment, with dorsal margin

concave at extreme end, the tip therefore appearing suddenly narrowed. Aedeagus a large and membranous sac, with one long, thin internal sclerotized lod.

Specimens examined: 1♂, Nukabira, Hokkaido, June 26, 1959 (H. OHONO); 10♂♂, Kurokawa-mura, Kitakanbara-gun, Niigata Pref., June 27, 1964 (K. BABA); 7♂♂, same locality, Sept. 3, 1964 (K. BABA); 10♂♂, Budo Pass, Iwafune-gun, Niigata Pref., June 27, 1964 (K. BABA); 11♂♂1♀, Akuzawa, Yamakita-machi, Kanagawa Pref., May 17, 1967 (M. KOBAYASHI); 19♂♂, Genjirozawa, Ohokura, Hatano-shi, Kanagawa Pref., May 24, 1968 (M. KOBAYASHI); Kaeruzawa, Tsukui-machi, Kanagawa Pref., July 4, 1968 (M. KOBAYASHI); 7♂♂3♀♀, Asahi-mura, Iwafune-gun, Niigata Pref., Sept. 25, 1968 (M. KOBAYASHI); 2♂♂, Sanhoku-machi, Iwafune-gun, Niigata Pref., Sept. 25, 1968 (M. KOBAYASHI); 2♂♂, Shiraishizawa, Yamakita-machi, Kanagawa Pref., July 29, 1970 (M. KOBAYASHI); 1♂, Kamiange, Hachioji-shi, Tokyo, May 31, (M. KOBAYASHI); 3♂♂, Riv. Niizaki, Odahara-shi, Kanagawa Pref., June 24, 1973 (M. KOBAYASHI); 1♂, Saijoji, Minamiashigara-shi, Kanagawa Pref., July 2, 1973 (M. KOBAYASHI).

Distribution: Japan (Kyoto, Shiga, Nagano, Niigata, Kanagawa, Hokkaido Prefectures).

Sortosa (Dolophilodes) shinboensis sp. nov.

(Pl. 1, fig. 6, & Pl. 3, figs. 7-9)

Male: Length 7 mm. Color shades of brown, and the wings with an irrorate pattern of lighter markings caused by light on a uniform light brown membrane. General structure typical for genus. Spurs count of the legs 2-4-4; inner spurs longer than outer spurs. Venation complete, with R_{2+3} branched midway between s and tip of wing. Male genitalia as in figures. Ninth segment with lateral and ventral areas broad. Lateral lobes of tenth tergite with curved ventrad. Cerci more or less triangular, the apical margin slightly incised, with erect hairs. Clasper with basal segment slightly longer than apical segment; the basal segment is very definitely constricted beyond the base and the apex forms a circular, spatulate area. Aedeagus a large and chiefly membranous sac.

Holotype. Male; Mt. Shinobo, Asahi-mura, Iwafune-gun, Niigata Pref., May 21, 1977.; (K. BABA)

This species is most closely related to *japonica*; it differs from the structure of the apical segment of the clasper and tenth tergite.

Distribution: Japan (Niigata Prefecture).

Sortosa (Dolophilodes) iroensis sp. nov.

(Pl. 1, fig. 7, & Pl. 4, figs. 1-3)

Male: Length 8 mm. Color yellowish brown except for indefinite areas on the femora and tibia which are a slightly shade. General structure typical for genus.

Spurs count of the legs 2-4-4; inner spurs longer than outer spurs. Front wing with R_{2+3} branched between s and third from tip of wing. Genitalia as in figers. Ninth segment annular, constricted ventrad to form a very narrow. Tenth tergite divided into two long lobes, the mesal line shaped carinate and very high. Cerci large, nearly leaf-shaped, rounded at apex; they are clothed with erect hairs. Clasper with basal segment slightly longer than apical segment; the basal segment definitely constricted beyond the base and the apex forms a angulaer; the apical segment with ventral margin curved at the inside and the apex forms a circulat and with a conspicuous brush of black peg-like setae on the mesal; the base of the clasper with two pair of very long spines. Aedeagus largely membranous indistinct.

Holotype. - Male: Mt. Iro, Tsukui-machi, Kanagawa Pref.,; Sept. 23, 1973.; (M. KOBAYASHI). Paratype. - 1 ♂; Kanagawa Pref.,; Setp. 23, 1973.; (M. KOBAYASHI), 1 ♂; Kamiangi, Hachioji-shi, Tokyo.; 16, 1977.; (M. KOBAYASHI). 1 ♂; Riv. Tochiya, Fujino-machi, Kanagawa Pref., Sept. 15, 1973.; (M. KOBAYASHI)

This species differ from the former in having two pair of the long spines at base of the clasper and brush of black peg-like setae on the mesal of the clasper.

Distribution: Japan (Kanagawa, Tokyo prefectures)

Sortosa (Dolophilodes) babai sp. nov.

(Pl. 1, fig. 8, & Pl. 4, figs. 4-5)

Male: Legth 6mm. Color dark brown, the legs slightly paler than body. General structure typical for genus. Spurs count of the legs 2-4-4; inner spurs longer than outer spurs. Front wing with R_{2+3} unbranched. Genitalia as in figers. Ninth segment annular ventrad to form a very narrow; apical margin rounded; dorsal face of ninth tergite with brush of long, stout setae. Tenth tergite triangular, divided into two ∇ -like lobes. Cerci longer than tenth tergite and rounded at apex; they are clothed sparse erect hairs. Clasper with basal segment longer than apical segment; the basal segment is definitely constricted beyond the base and the apex emarginat; the apical segment very slender than the basal segment, rounded at apex, inner face concave. Aedeagus chiefly membranous sac, with internal sclerotized rod,

Holotype. -Male; Kurokawa-mura, Kitakandara-gun, Niigata Pref., Sept. 20, 1971; (K. BABA). Paratype. - 1 ♂; same date as for holotype.

This species differ from the other species belong to subgenus *Dolophilodes* in the structure of tenth segment.

Distribution: Japan (Niigata Prefecture)

Sortosa (Dolophilodes) nomugiensis sp. nov.

(Pl. 1, fig. 9, & Pl. 4, figs. 6-8)

Male: Lenth 6mm. Color dark brown except for indefinit area the femora and tibiae. General structure typical for genus. Spurs count of the legs 2-4-4; inner

spurs longer than outer spurs. Front wing with R_{2+3} unbranched. Genitalia as in figs. Ninth segment annular, constricted ventrad to form a very narrow. Tenth tergite triangular, divided into two lobes. Lobes of tenth tergite simple, elongate, slightly acuted at apex. Cerci sinuate, slightly longer than tenth tergite and rounded at apex, inner margin serrated; they clothed with sparse hairs. Clasper with basal segment slightly longer than apical segment; the basal segment wide and long, apical margin emarginate, dorsal and ventral corners slightly produced into a sharp but short point, inner face concave; the apical segment wide, finger-shaped. Aedeagus chiefly membranous sac, with short, thick, internal sclerotized rod.

Holotype. -Male; Nomugi Pass, Takane-mura, Ohno-gun, Gifu Pref.; Aug. 16, 1977.; (M. KOBAYASHI). Paratype. -1♂; Shinmezawa, Ohokura, Hatano-shi, Kanagawa Pref.; Sept. 13, 1977.; (M. KOBAYASHI)

This species is most closely related to *auriculata* (MARTYNOV); it differs from in the structure of tenth tergite and cerci, aedeagus.

Distribution: Japan (Gifu, Kanagawa Prefectures)

Hisaura *New subgenus*

Type species: *Sortosa (Hisaura) commata* new species

Diagnosis: Front and hind wings with complete venation; R_{2+3} forking midway between *s* and tip of wing in front wing; hind with cross-vein between 2A and 3A. Clasper elongate and simple; tenth tergite without cleft, rounded at apex; cerci simple from dorsal view, comma-shaped. Aedeagus chiefly membranous sac, with long internal sclerotized rod.

This subgenus is most closely related to the subgenus *Dolophilodes* ULMER in the general structure. It differs from that subgenus, however, in the different shape of the tenth tergite.

Sortosa (Hisaura) commata sp. nov.

(Pl. 1, fig. 10, & Pl. 5, figs. 1-3)

Male: Length 15mm. Color dark brown except for indefinite areas on the femora and tibiae are slightly shade. General structure typical for genus. Spurs count of the legs 2-4-4; inner spurs longer than outer spurs. Front wing with R_{2+3} branched midway between *s* and tip of wing; hind wing R_{4+5} sessile. Genitalia as in figs. Ninth segment annular, constricted ventrad to form a very narrow; the dorsal portion membranous, rounded at apex; the mesal line black, sclerotized. Cerci shorter than tenth tergite, comma-shaped; they are clothed with sparse hairs. Clasper with basal segment as long as apical segment; the basal segment is definitely constricted beyond the base; the apical segment finger-shaped, rounded at apex. Aedeagus large membranous, egg-shaped, with a long internal sclerotized rod and

five sclerotized internal lobes.

Holotype. - Male; Geihoku-machi, Yamagata-gun, Hiroshima Pref., March 21, 1977; (K. BABA). Paratype. - 3♂♂; same date as for holotype.

Distribution: Japan (Hiroshima Prefecture)

Genus **Wormaldia** McLACHLAN 1865

Type species; *Hydropsyche occipitalis* PICTET

Wormaldia McLACHLAN, 1865, Trans. Ent. Soc. London, (3), 5; 140

Wormaldia: McLACHLAN, 1878, Tev. and Syn. Trich.; 380

Wormaldia: ULMER, 1907, Gen. Ins. 60; 190

Wormaldia: MARTYNOV, 1934, Tabl. analyt. Faune URSS 13; 168

Wormaldia: ROSS, 1949, Rroc. Ent. Soc. Washington, 51; 154

Wormaldia: ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana; 60

Diagnosis: Antennae stout. shorter than the wings; the basal joint swollen, shorter than head. Ocelli present. Maxillary palpi long; the two first joints short, stouter than the rest, the second joint shorter; third joint very long; forth sort, scarcely longer than the second; fifth about as long as the third. Labial palpi small, with two moderately long basal joint and a very long terminal one. Primitive forms with full complement of veins except in hind wing, in which 2A has atrophied beyond the basal cross-veins and the basal anal cell are realigned as in figer, with the basal cross-veins froming a linear bar, and 1A and 3A divergent. Spurs count of the legs 2-4-4. Cerci elongate or large and rhombic, sometimes fused to ninth pleural region.

In the course of the study on Japanes Philopotamidae, I foud undescribed species belong to subgenus *Wormaldia* in Japan.

Key to subgenera

1. Hind wing with R₁ and R₂ ending some distance apart at with margin
..... *Wormaldia* McLACHLAN
- Hind wing with R₁ and R₂ fused just befor wing margin
..... *Dolcalanes* BANKS

Subgenus **Wormaldia** McLACHLAN 1865

Type species: *Hydropsyche occipitalis* PICTET

Wormaldia McLACHLAN, 1865, Trans. Ent. Soc. London (3) 5; 140

Dolophilus McLACHLAN. 1868, Tran. Ent. Soc. London.; 303

Paragapetus BANKS, 1914, Can. Ent., 46; 202

Dolophiliella BANKS, 1930, Psyche, 37; 230

Wormaldia: ROSS, 1949, Proc. Ent. Soc. Washington, 51; 154

Wormaldia: Ross, 1956, Evolution and classification of the mountain caddisflies. Urbana.; 61

Diagnosis: General structure typical for genus. Hind wing with R_1 and R_2 ending some distance apart at wing margin. Tenth tergite triangular or bottle-shaped. Cerci slender, stick-shaped. Clasper two-segmented; basal segment broadened; apical segment rounded, with black spines on mesal face of the apical portion.

Distribution: America, Eurasi, Africa, Asia (New Locality)

Key to species

1. Seventh and eighth sternite with triangular processes2
- Seventh sternite with triangular process; eighth sternite without process; apical segment of clasper curved dorsad.....*uonumana* sp. nov.
2. Apical segment of clasper wide, very shorter than the basal segment; tenth segment nearly triangular.....3
- Apical segment of clasper slender, longer or as long as the basal segment; tenth segment bottle-shaped.....6
3. Apical segment of clasper with seven brush lines of black peg-like setae on the mesal face at apex.....*yunotakiensis* sp. nov.
- Apical segment of clasper with numerous black peg-like setae on the mesal face at apex.....4
4. Apical margin of the eighth tergite projected.....*kurokawanus*
- Apical margin of the eighth tergite concaved inwardly.....5
5. Cerci elongate, a pointed knife-shaped*rarus*
- Cerci elongate, rounded at apex, stick-shaped.....*saekiensis* sp. nov.
6. Apical margin of eighth tergite with a process.....7
- Apical margin of eighth tergite without process.....8
7. Apical margin process of eighth tergite elongate.....*nabewarnus* sp. nov.
- Apical margin process of eighth tergite short, nearly triangular.....*sumuharana* sp. nov.
8. Cerci elongate9
- Cerci spearhead-shaped.....*yakuensis* sp. nov.
9. Tenth segment with lateral flange:*fujinoensis* sp. nov.
- Tenth segment without lateral flange.....*kadowkii* sp. nov.

***Wormaldia* (*Wormaldia*) *uonumana* sp. nov.**

(Pl. 1, fig. 11, & Pl. 5, figs. 4-7)

Male: Length 7mm. Color various shades medium brown, the pubescence on the wings lighter, appearing almost golden. General structure typical for genus. Seventh sternite with narrow truncate projection from posterior margin.

Eighth tergite with shallow median notch on apical edge; remainder of apical margin crenulate. Genitalia as in figures. Ninth segment annular and long, reduced

to a narrow shape on the dorsal margin. Tenth tergite elongate, tapering to a point without lateral process, the apex with a large hook, recurved dorsally. Cerci cylindrical, bluntly pointed, Basal segment of clasper short, pomegranate-shaped; apical segment constricted at center, with apical spinose area wide, obliquely truncate. Aedeagus large; apical portion with a sclerotized rod.

This species is most closely related to *gabrie!la* (BANKS), differing from it in the structure of clasper.

Holotype. - Male; Yunotaki-mura, Kitauonuma-gun, Niigata Pref.; March 1, 1966 (K. BABA). Paratypes. 3♂♂2♀♀; same date as for holotype.

Distribution: Japan (Niigata Prefecture)

***Wormaldia (Wormaldia) yunotakiensis* sp. nov.**

(Pl. 1, fig. 12, & Pl. 5, figs. 8-11)

Male: Length 6mm. Color various shaded of medium brown. Wings with lighter brown hairs. General structure typical for genus. Seventh and eighth sternites each with large, triangular processes. Genitalia as in figs. Ninth segment annular and long, reduced to a narrow strap on the ventral margin. Tenth tergite elongate; apical portion narrow, rounded at apex. Cerci elongate, crenulate; the apex rounded. Basal segment of clasper wide, nearly rectangular, with apical margin concaved inwardly; apical segment very shorter than basal segment, with outer margin concaved at basal portion, the inner surface bearing eight lines of short black setae. Aedeagus with three sclerotized rods; two rods very shorter than other rod.

This species differs from the existing species in the structure of clasper.

Holotype. - Yunotaki-mura, Kitauonuma-gun, Niigata Pref.; March 1, 1966 (K. BABA). Paratype. 1♂; same date as for holotype.

Distribution; Japan (Niigata Prefecture)

***Wormaldia (Wormaldia) saekiensis* sp. nov.**

(Pl. 1, fig. 13, & Pl. 6, figs. 1-4)

Male: Length 6mm. Color various shades of brown, dorsally. wings with darker brown hairs. Front wing without M_4 . General structure typical for genus. Seventh and eighth sternites with apical processes. Eighth tergite with deep central indentation of its apical margin. Genitalia as in figs. Tenth tergite elongate and tapering smooth to rather round point. Cerci elongate, narrow, parallel sided. Basal segment of clasper short, thick, cylindrical, truncate, apical segment thick, very shorter than the basal segment, rounded at apex. Apical spinose area nearly egg-shaped. Aedeagus with three internal sclerotized rods; one rod very longer than other rods.

This species is most closely related to the preceding, differing from it in the structure of clasper.

Holotype. Male; Yoshiwa-mura, Saeki-gun, Hiroshima Pref.; May 11, 1976 (K.

BABA)

Distribution: Japan (Hiroshima Prefecture)

Wormaldia (Wormaldia) kurokawanus KOBAYASHI 1968

(Pl. 1, fig. 14, & Pl. 6, figs. 5-8)

Wormaldia kurokawanus KOBAYASHI, 1968, Bull. Kanagawa Pref. Mus. (Nat. Hist.), 1 (1); 1

Male: Length 5mm. Color dark-brown, the under parts lighter. General structure typical for genus. Wing uniform gray-brown. Front wing without M_4 . Seventh and eighth sternites with a median processes; one of the seventh sternite clothed with membranous sac, rounded at apex. Posterior margin of eighth tergite produced into short, rounded at apex. Genitalia as in figers. Ninth segment with lateral margin produced anteriorly into a wide flange within the eighth segment. Tenth tergite tapering smoothly to a round point. In this feature the species closely resembles *saekiensis*. Cerci long and slender, rounded at apex. Clasper with basal segment fairly long and deep; the apical segment is acuted at apex and bear an angular mesal patch of black spicules at the apex. Aedeagus with three internal sclerotized rods; one rod very short.

This species is most closely related to the preceding, deffering from it in the structure of eighth tergite and clasper.

Specimens examined: 1♂1♀, Kurohawa-mura, Kitakanbara-gun. Niigata Pref., Aug. 20, 1954 (K. BABA); 1♂, same date locality, July 2, 1977 (K. BABA); 2♂1♀, Oyu, onsen, Niigata Pref., March 1, 1966 (K. BABA); 1♂, Yoshiwa-mura, Hiroshima Pref., May 11, 1976 (K. BABA).

Distribution: Japan (Hiroshima, Niigata Prefectures)

Wormaldia (Wormaldia) nabewarinus KOBAYASHI

(Pl. 1, fig. 15, & Pl. 7, figs. 1-3)

Wormaldia nabewarinus KOBAYASHI, 1965, Bull. Kanagawa Pref. Mus. (Nat. Hist.), 1 (2); 20

Male: Length 5mm. Color dark-brown, the under parts lighter. General structure typical for genus. Wings uniform gray-brown; front wing without M_4 . Seventh and eighth sternites with a median processes. Apical margin of eighth tergite with a long process, rounded at apex. Genitalia as in figers. Ninth segment wide, nearly round-shaped; frontal and apical margin produced at central portion. Tenth tergite elongate, the one-thirds nealy parallel-sided, the apex narrowed to a point; along each side is a row of four long setae. Cerci slender, shorter than tenth tergite. Clasper with basal segment narrowed towards apex, shorter and stockier than apical segment, which is slightly narrowed just beyond midle and expended into a slightly spatulate apex. The inner face of this spatulate apex bears a brush of

short, stout, black setae. Aedeagus with three internal sclerotized rods; all rods short.

This species is distinguished from all other species belong to subgenus *Wormaldia* in the structure of eighth and tenth tergites.

Specimens examined: 1 ♂, Monzen, Murakami-shi, Niigata Pref., June 28, 1964 (K. BABA); 2 ♂♂, Sumuhara, Nagaoka-shi, Niigata Pref., May 15, 1966 (K. BABA); 1 ♂, Nabewarizawa, Yamakita-machi, Kanagawa Pref., June 5, 1967 (M. KOBAYASHI); 2 ♂♂, Dintsu, Fujino-machi, Kanagawa Pref., June 16, 1973 (M. KOBAYASHI).

Distribution: Japan (Kanagawa, Niigata Prefectures)

***Wormaldia* (*Wormaldia*) *sumuharana* sp. nov.**

(Pl. 1, fig. 16, & Pl. 7, figs. 4-6)

Male: Length 5mm. Color various shades of medium brown, the pubescence on the wings darker, appearing almost black. Front wing has lost M_4 . General structure typical for genus. Seventh and eighth sternites with mesal projection of the posterior margin. Posterior margin of eighth tergite produced on the meson into a long process, in lateral view deep. Genitalia as in figs. Ninth segment with a deep anterior projection but without any posterior projection. Tenth tergite elongate, swollen just beyond middle and from there tapering to a point, bearing a pair of lateral flanges, and along each side a series of three long peg-like setae. Cerci long and slender. Clasper with two segment of about equal; apical segment shallower, slightly enlarged at apex, and with black spine on mesal face one rod of the apical portion of the segment. Aedeagus with two internal sclerotized rods; elongate and other rods large, box-shaped.

This species is most closely related to *nabewarinus* KOBAYASHI, differing from it in the structure of the posterior margin of eighth tergite and clasper.

Holotype. -Male; Sumuhara, Nagaoka-shi Niigata Pref., May 15, 1966 (K. KOBAYASHI). Paratype. -1 ♂, same date as for holotype.

Distribution: Japan (Niigata Prefecture)

***Wormaldia* (*Wormaldia*) *rarus* (KOBAYASHI) 1959**

(Pl. 7, figs. 7-8)

Dolophilodes rarus KOBAYASHI, 1959, Bull. Nat. Sci. Mus. (Tokyo), 44; 345

Male: Length 4mm. Color shades of black-brown, the dorsum darker; the pubescence on the wings darker, appearing almost black; front wing has lost M_4 . General structure typical for genus. Seventh and eighth sternites with mesal projection on the posterior margin, one on the seventh sternite long, stout. Genitalia as in figs. Ninth tergite with deep concave at apical margin. Tenth tergite elongate, nearly triangular, rounded at apex. Cerci slender, a pointed knife-shaped. Clasper two-segmented; basal segment very longer than apical segment, apical margin

shallower, rounded at apex, and with black spines on mesal face of the apical portion the segment.

Specimens examined: 2 ♂♂, Yoshii-machi, Ukiba-gun, Fukuoka Pref., May 3, 1957; (N. GYOTOKU).

Distribution: Japan (Fukuoka Prefecture)

Wormaldia (Wormaldia) kadowakii sp. nov.

(Pl. 1, fig. 17, & Pl. 8, figs. 1-3)

Male: Length 6mm. Color various shades of dark-brown, the dorsum darker. Front wings has lost M_4 . General structure typical for genus. Seventh and eighth sternites with mesal projection of the posterior margin; one on the seventh sternite long, stout. Genitalia as in figs. Ninth segment with anterior margin froming a broad. Tenth tergite elongate, typical bottle-shaped; the dorsal face with two pair long setae; in lateral view apical portion curved upwardly. Cerci long and slender. Clasper with two segment of about equal, apical segment shallower slightly enlarged at apex, and with black spines on mesal face of the apical portion of the segment. Aedeagus with three internal sclerotized rods.

This species most closely related to *sumuharana*, differing from it in the structure of tenth tergite and clasper.

Holotype. Male; Daito-machi, Ohara-gun, Shimane Pref., July 25, 1964; (H. KADOWAKI); Paratype- 1 ♂; same date as for holotype.

Distribution: Japan (Shimane Prefecture)

Wormaldia (Wormaldia) fujinoensis sp. nov.

(Pl. 1, fig. 18, & Pl. 8, figs. 4-6)

Male: Length 5mm. Color various shades of dark-brown, the dorsum darker; the pubescence on the wings darker, appearing almost black. Front wing has lost M_4 . General structure typical for genus. Seventh and eighth sternites with mesal projection on the posterior margin, one on the seventh sternite long, stout, clothed with membranous sac. Genitalia as in figs. Ninth segment wide and large, its anterior margin produced into round point. Tenth tergite elongate, bottle-shaped, bearing a pair of long lateral flanges, rounded at apex. Cerci long and slender, shorter than tenth tergite. Clasper structure similar to *kadowakii*, with two segments of about equal, apical segment shallower, slightly enlarged at apex, and with black spines on mesal face of apical portion of the segment. Aedeagus with four internal sclerotized rods.

This species is most closely related to *kadowakii*, but differs from it the structure of tenth tergite.

Holotype. Male; Dintsu, Fujino-machi, Kanagawa Pref., June 16, 1973; (M. KOBAYASHI). Paratype. -1 ♂; same date as for holotype.

Distribution: Japan (Kanagawa Prefecture)

***Wormaldia* (*Wormaldia*) *yakuensis* sp. nov.**

(Pl. 1, fig. 19, & Pl. 8, figs. 7-8)

Male: Length 5mm. Color various shades of dark-brown, the pubescence on the wings darker, appearing almost black. Front wing has los M_4 . General structure typical for genus. Seventh and eighth sternites with mesal projection on the posterior margin; seventh sternite process acuted at apex; eighth sternite process rounded at apex. Genitalia as in figers. Ninth segment froming a wide lateral and ventral bands. Tenth tergite tapering, and pointed, with a pair of roughed dorsolateral flages at middle portion. Cerci elongate, very shorter than tenth tergite, spearhaed -shaped. Clasper with is lightly narrowed just beyond middle and expended into a slightly spaculate apex. The inner face of this spaculate apex bears a brush of short, stout, black setae. Apical segment of clasper with a pair of triangular flages on ventral margin in dorsal view.

This species differs from other species belong to subgenus *Wormaldia* in the structure of tenth tergite and clasper.

Holotype. Male; Yaku Island, Kagoshima Pref.; July 31, 1974; (M. KOBAYASHI). Paratype. -2♂; same date as for holotype.

Distribution: Japan (Kagoshima Prefecture)

Subgenus ***Dolocanes*** BANKS 1937

Type species: *Dolocanes montana* BANKS, 1627

Dolocanes BANKS, 1937, Philippine Jour. Sci., 63; 168

Naganagapetus TSUDA, 1942, Mem. Sci. Kyoto Imp. Univ. (B), 17; 253

Catlina ROSS, 1948, Ann. Ent. Soc. Amer., 41; 22

Dolocanes: ROSS, 1956, Evolution and classification of the mountain caddisflies. Urbana. : 65

Diagnosis: General structure typical for genus. Front wing with R_1 and R_2 fused just before wing margin. Tenth tergite elongate stick-shped. Gerci short, finger-shaped. Clasper two-segmented; apical segment with black spines of the apical portion.

Distribution: Asia, Eastern North America

***Wormaldia* (*Dolocanes*) *kisensis* (TSUDA) 1942**

Naganagapetus kisoensis TSUDA, 1942, Mem. Coll. Sci. Kyoto Imp. Univ., (B), 17; 253.

Wormaldia kisoensis ROSS, 1957, Evolution and classification of the mountain caddisflies. Urbana.; 66

The original description of this species was based upon from Japan (TSUDA, 1942).

But I have no chance to examine on this species.

TSUDA described the species as follows.

Körper braun. Kopf und Pronotum sind gemischt mit goldgelben und schwarzen Haaren bedeckt. Flügelmembran grau, Adern braun.

Beim ♂ sind die Appendices praeanales in Lateralansicht stäbchenförmig, in Dorsalansicht etwas breiter, schwach nach unten gebogen. Die Rückenschuppe des 10. Segments ist in Dorsalansicht trapezförmig, in Lateralansicht unregelmässig viereckig, an der postero-ventralen Ecke spitz. Die Genitalfüsse sind zweigliedrig; das Basalglied gross, an der apicalen Innenecke stark vorgezogen (Dorsalansicht.); das Endglied ist etwa 1/2 male so lang als das Basalglied, am Apex (innerseits) kurz und dicht beborstet. Der penis nach dem Apex hin schmaler, in Dorsalansicht gerade, in Ventralansicht etwa S-förmig (an apicalen Teil nach oben) gebogen, in der Mitte jederseits mit einem dornigen Fortsatz, welcher sich nach dorso-lateral richtet.

Körperlänge 3.5 mm; Länge des Vorderflügels 4 mm; Flügelspannung also etwa 9 mm.

Distribution: Japan (Nagano Prefecture).

References

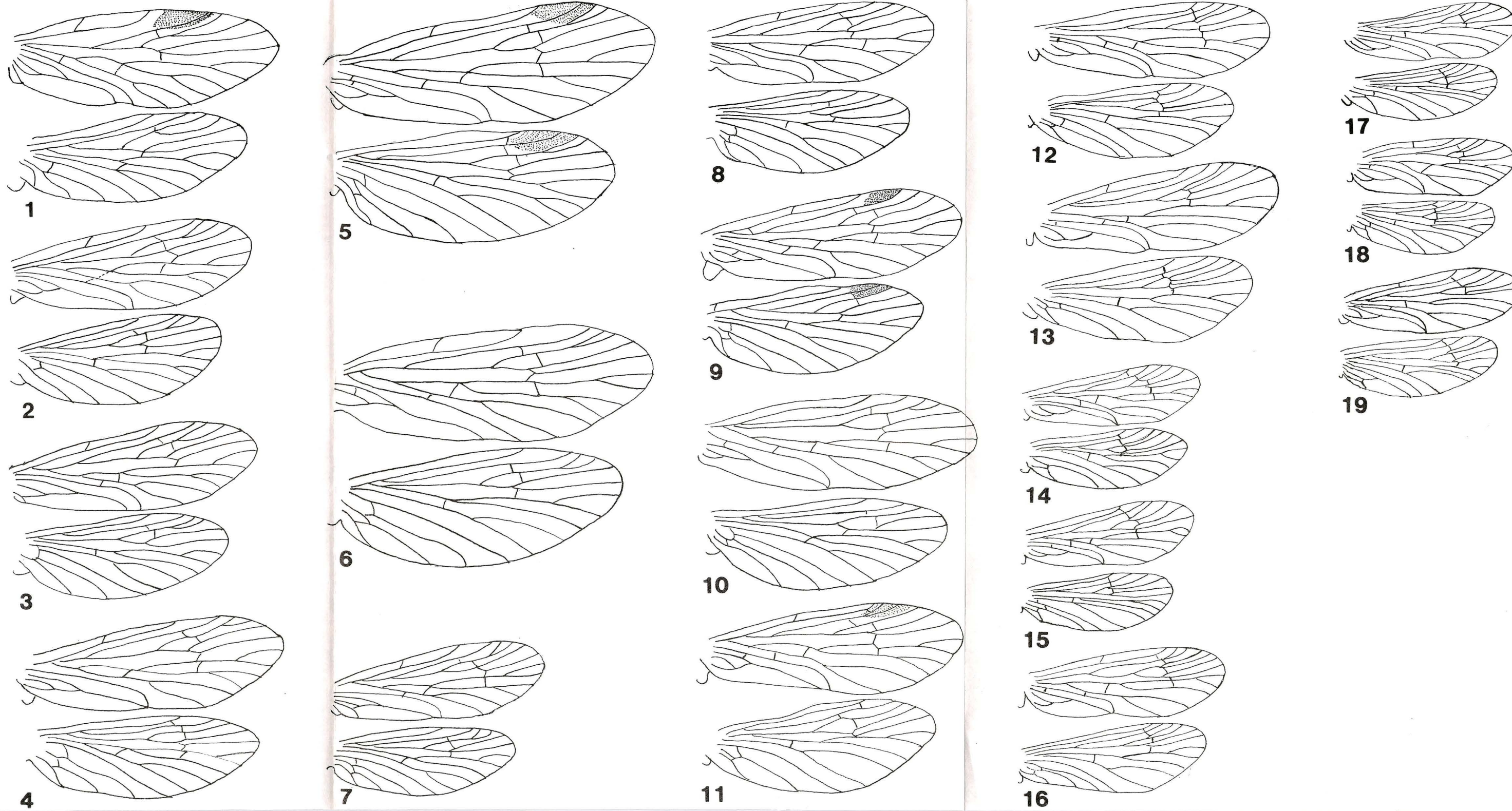
- BANKS, N. 1906. New Trichoptera from Japan. Proc. Ent. Soc. Washington, 7; 106-112.
- BETTEN, C. 1934. The Caddis-flies or Trichoptera of New York State. N. Y. State Mus. Bull. 292; 576 pp.
- KOBAYASHI, M. 1959. Caddisfly Fauna of the Vicinity of Yoshii-machi, Fukuoka Prefecture, with Descriptions of Five New Species. Bull. Nat. Sci. Mus., Tokyo. 4 (3); 343-354.
- , 1964. Notes on the Caddisflies of Hokkaido, with Description of Two New Species. Bull. Nat. Mus. Tokyo. 7 (1); 83-90.
- , 1968. Notes on the Caddisflies of Niigata Prefecture, with Six New Species. Bull. Kanagawa Pref., Mus. (Nat. Hist.), 1 (1); 1-11.
- , 1969. Four New Species of Trichoptera from Japan. Bull. Kanagawa Pref., Mus. (Nat. Hist.), 1 (2); 17-22.
- MARTYNOV, A. B. 1934. Trichoptera Annulipalpa of the USSR. Leningrad. 343pp.
- , 1935. Trichoptera of the Amur region I. Trav. Inst. Zool. Acad. Sci. URSS. 2; 205-395.
- MOSELY, M. E. & D. E. Kimmins. 1953. The Trichoptera of Australia and New Zealand. British Mus. (Nat. Hist.). London. 550 pp.
- ROSS, H. H. 1644. The caddisflies or Trichoptera of Illinois. Bull. Ill. Nat. Hist. Sur., 23; 326pp.
- , 1956. Evolution and Classification of the mountain Caddis flies. Univ. Ill. Press, Urbana. 213 pp.
- SCHMID, F. 1968. Le Genre *Gunugiella* ULMER. Cana. Ent. 100; 897-957.
- TSUDA, M. 1939. Zur Kenntnis der japanischen Philopotamiden. Annot. Zool. Japonenses. 18; 295-297.
- , 1940. Zur Kenntnis der japanischen Rhyacophilinen. Annot. Zool. Japonenses. 19; 119-135.

- . 1940. Zur Kenntnis der japanischen Glossosomatinen. Annot. Zool. Japonenses. 19; 161-194.
- . 1942. Japanische Trichopteren I. Systematik. Mem. Coll. Sci. Kyoto Imp. Univ. (B), 17; 239-339.
- ULMER, G. 1907. Trichoptera. Gatalogues de Collections zoologiques du Baron Edm. de Selys Longchamps. 6 (1); 1-102.
- . 1907. Trichopteres dans Genera Insectorum. 60. 259 pp.

Pl. 1.

Front and hind wings of *Chimarra* and *Sortosa*.
Wormaldia.

1. *Chimarra tsudai*, 2. *Sortosa kisoensis*, 3. *S. niitakaensis*, 4. *S. auriculata*, 5. *S. japonica*, 6. *S. shinboensis*, 7. *iroensis*, 8. *S. babai*, 9. *S. nomugiensis*, 10. *S. commata*, 11. *Wormaldia uonumana*, 12. *W. yunotakiensis*, 13. *W. saekiensis*, 14. *W. kurokawanus*, 15. *W. nabewarinus*, 16. *W. sumuharana*, 17. *W. kadowakii*, 18. *W. fujinoensis*, 19. *W. yakuensis*



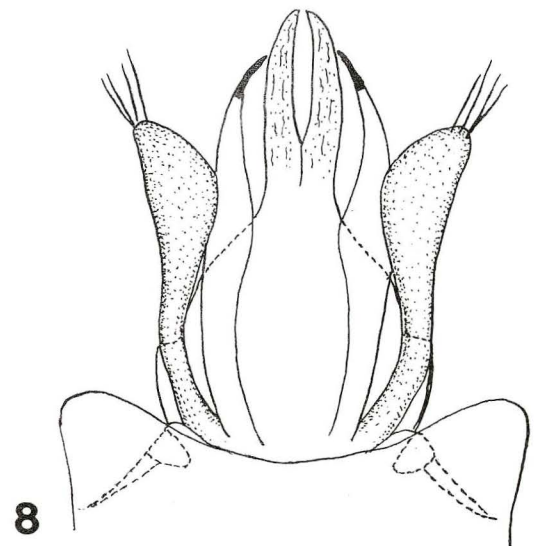
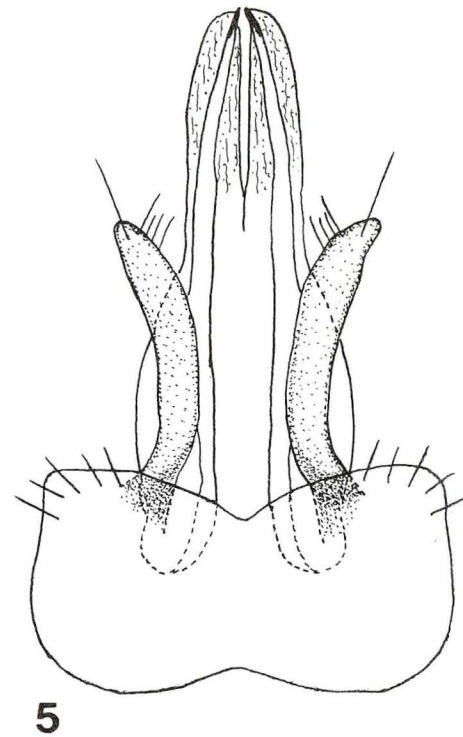
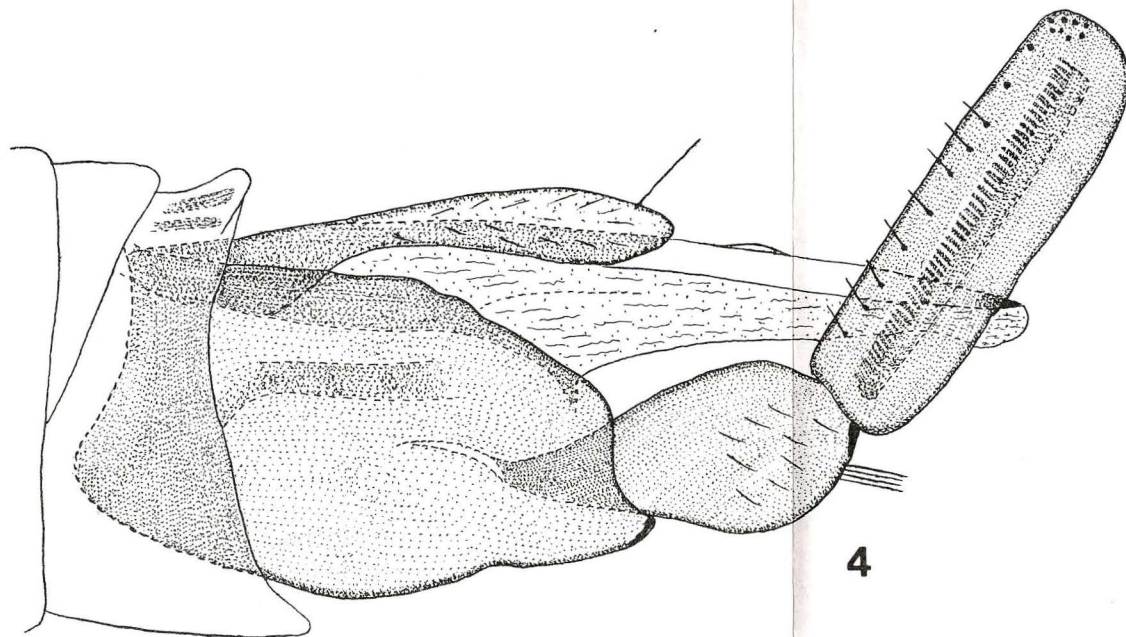
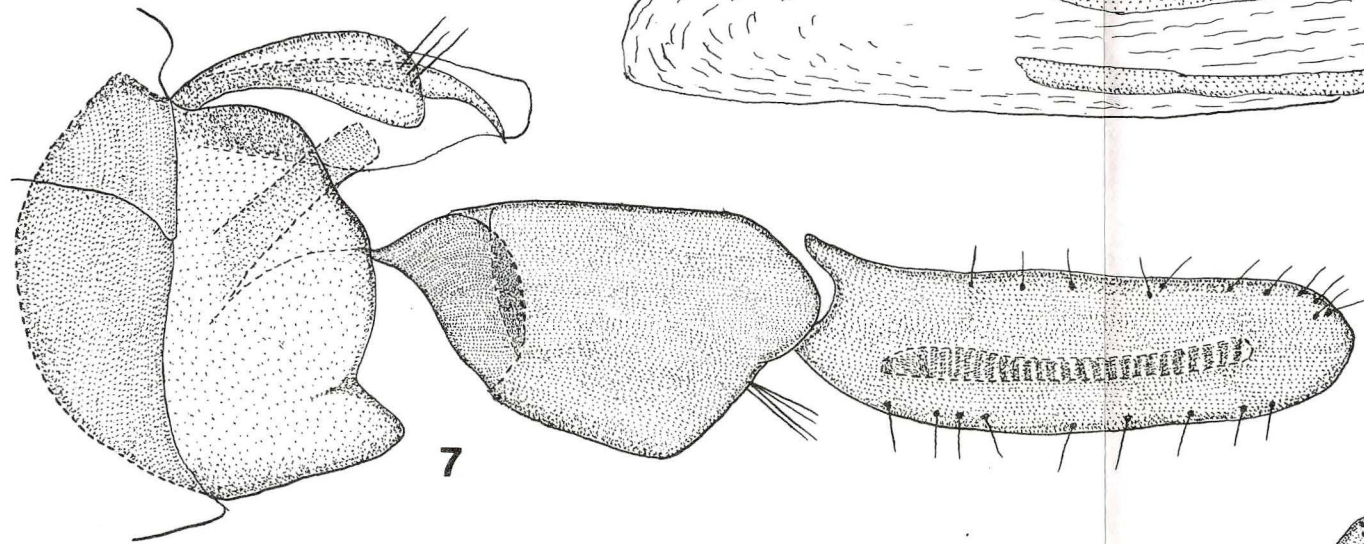
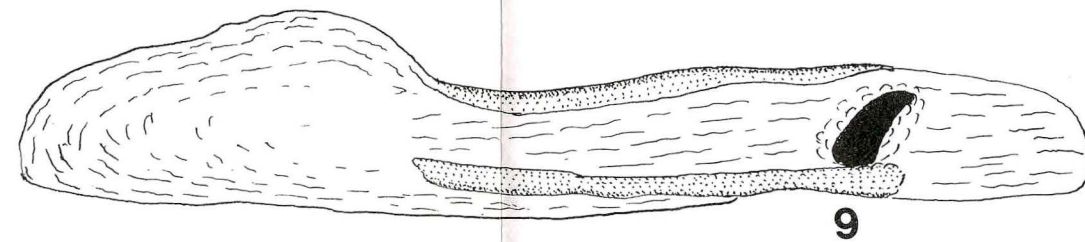
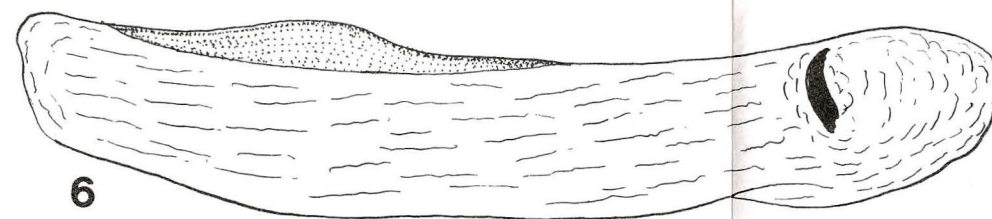
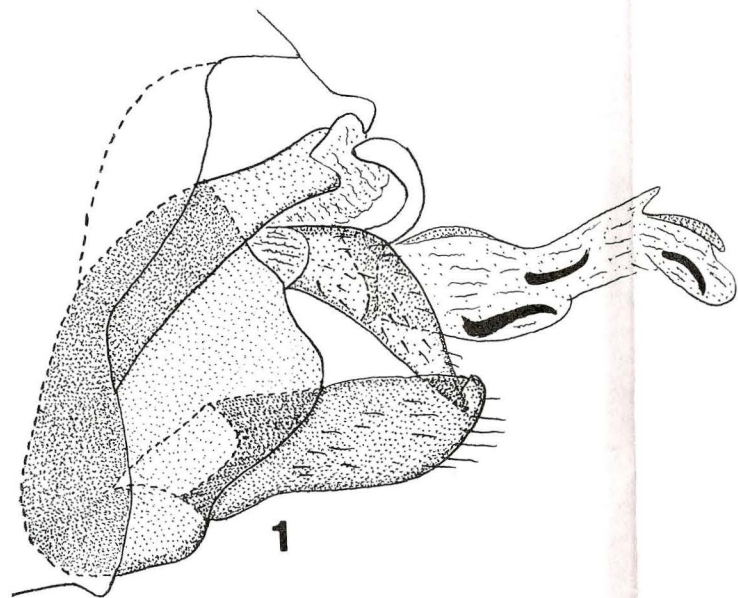
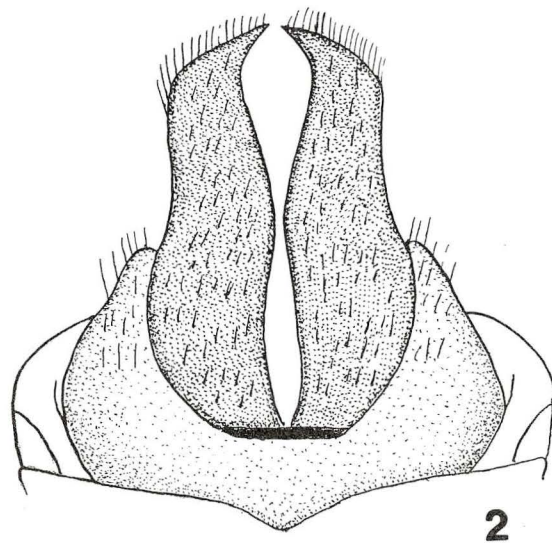
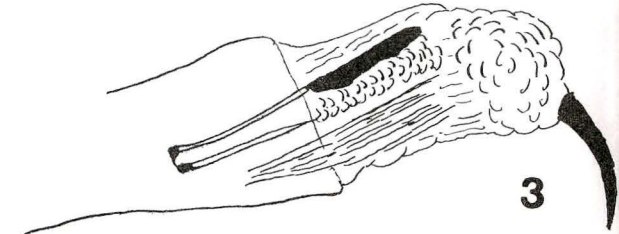
Pl. 2.

figs. 1-3. Genitalia of *Chimarra tsudai* Ross
1. Lateral aspect, 2. Dorsal aspect of tenth
segment, 3. Aedeagus.

figs. 4-6. Genitalia of *Sortosa kisoensis* (Tsuda)
4. Lateral aspect, 5. Dorsal aspect of tenth
segment, 6. Aedeagus.

figs. 7-9. Genitalia of *Sortosa niitakaensis* Ko-
BAYASHI

7. Lateral aspect, 8. Dorsal aspect of tenth
segment, 9. Aedeagus.



Pl. 3.

figs. 1-3. Genitalia of *Sortosa auriculata* (MARTYNOV)

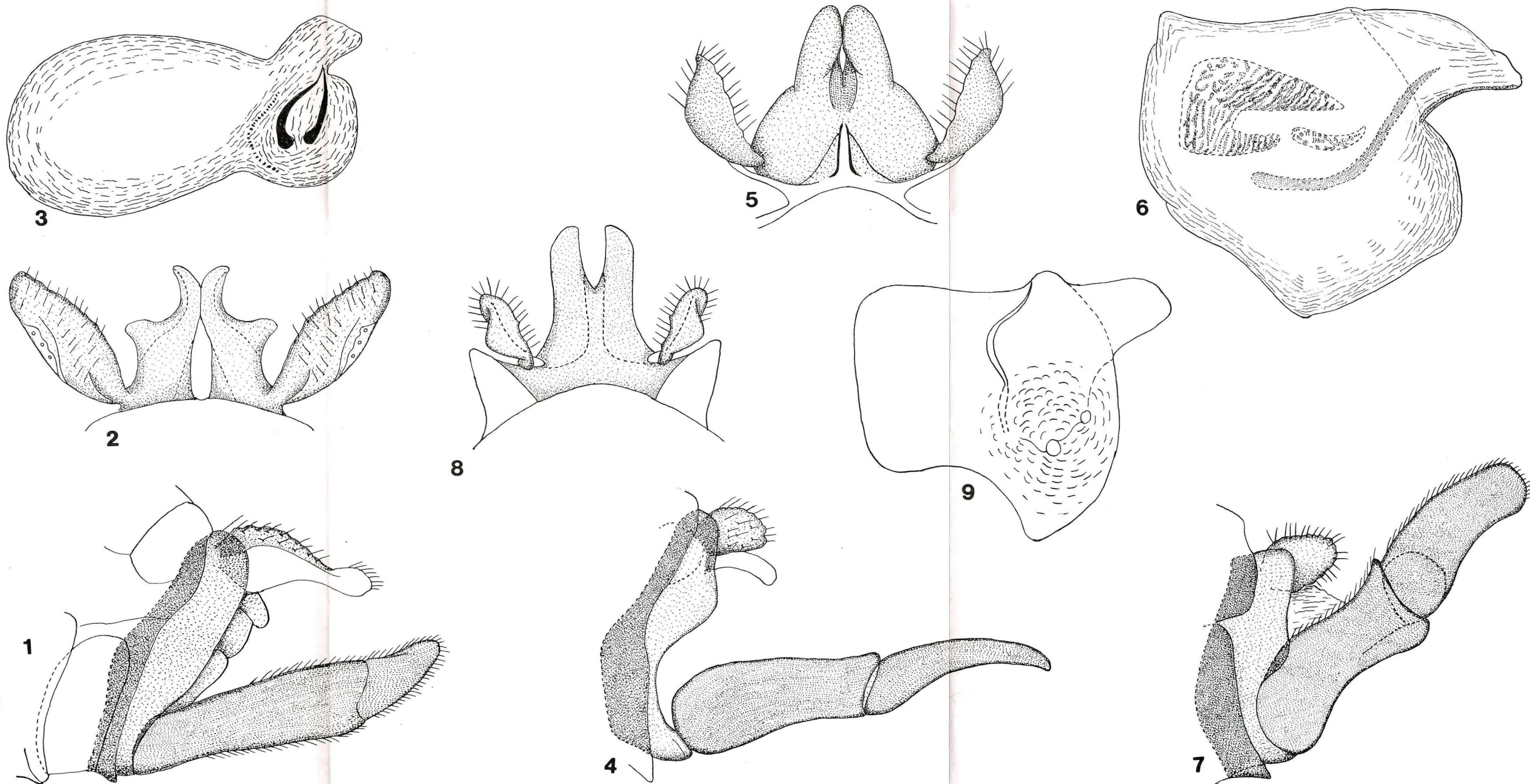
1. Lateral aspect, 2. Dorsal aspect of tenth segment, 3. Aedeagus.

figs. 4-6. Genitalia of *Sortosa japonica* (BANKS)

4. Lateral aspect, 5. Dorsal aspect of tenth segment, 6. Aedeagus.

figs. 7-9. Genitalia of *Sortosa shinboensis* sp. nov.

7. Lateral aspect, 8. Dorsal aspect of tenth segment, 9. Aedeagus.

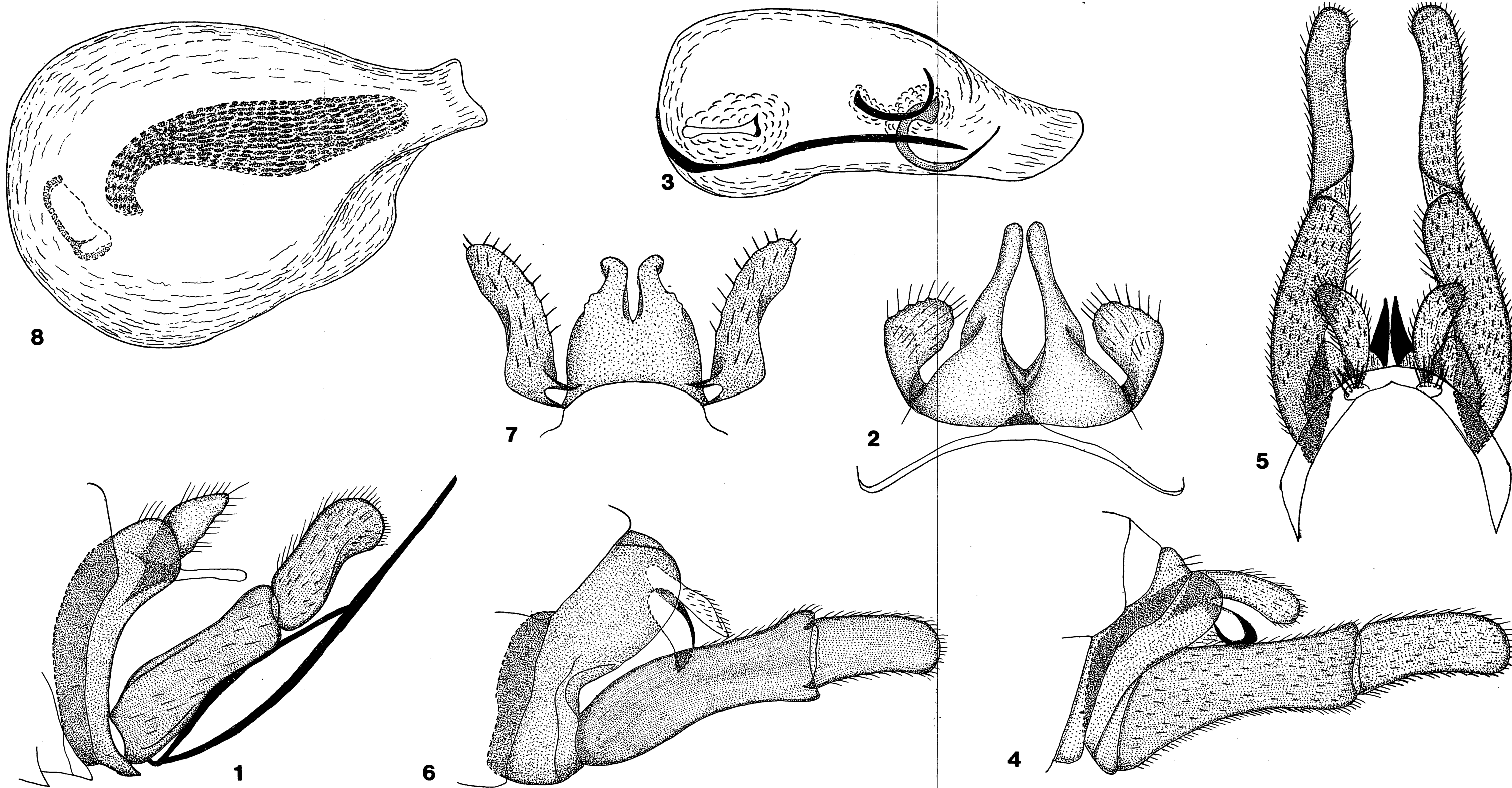


Pl. 4.

figs. 1-3. Genitalia of *Sortosa iroensis* sp. nov.
1. Lateral aspect, 2. Dorsal aspect of tenth segment, 3. Aedeagus.

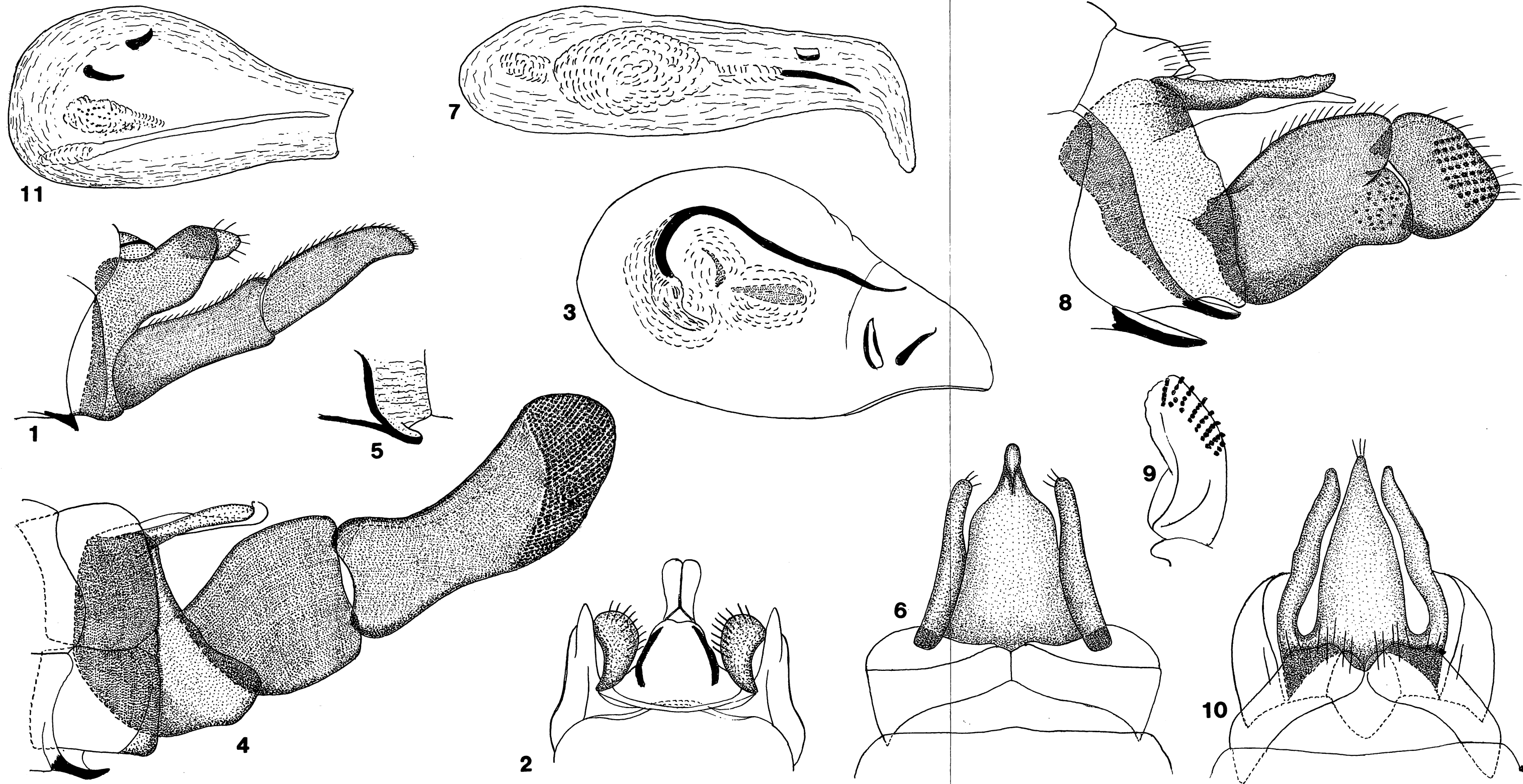
figs. 4-5. Genitalia of *Sortosa babai* sp. nov.
4. Lateral aspect, 5. Dorsal aspect of tenth segment.

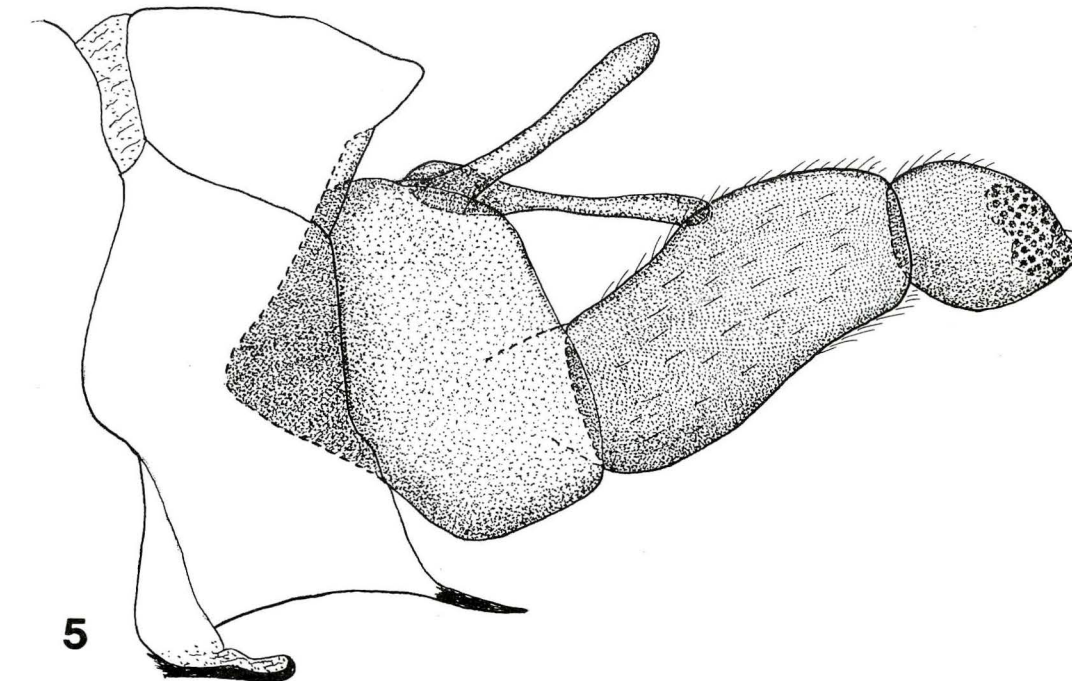
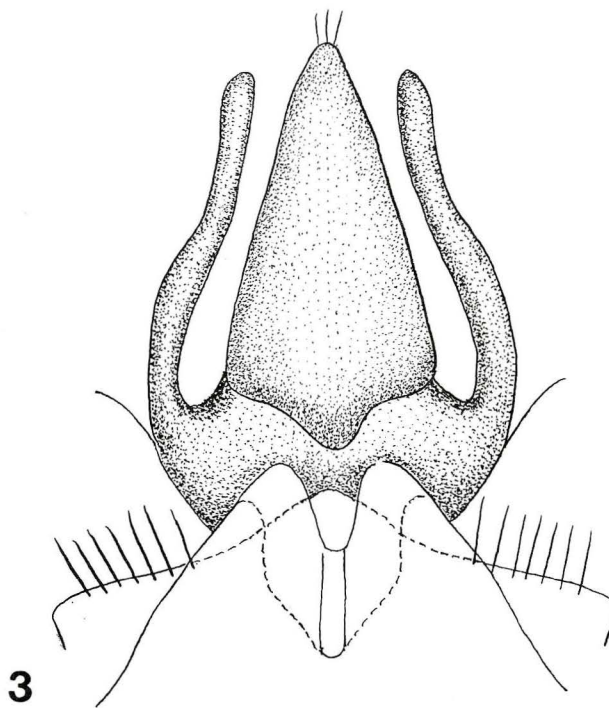
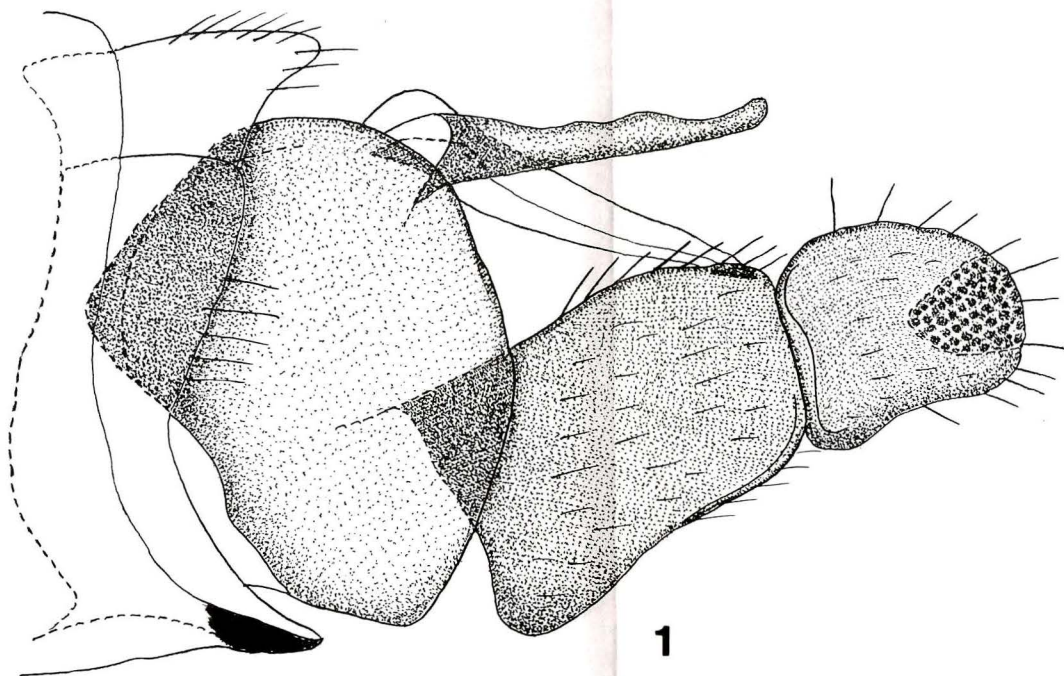
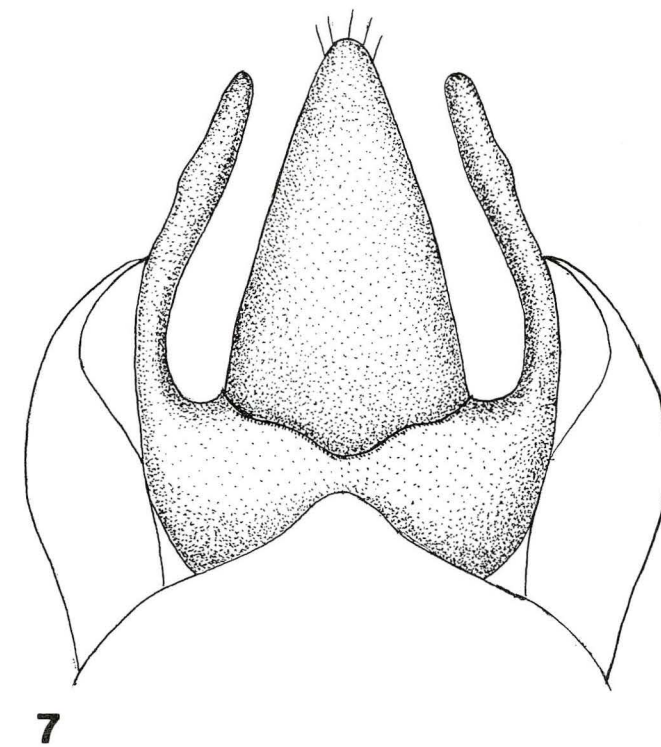
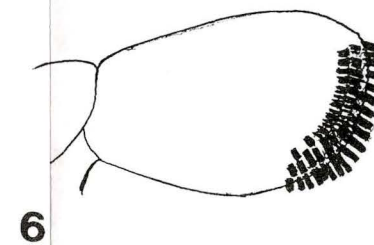
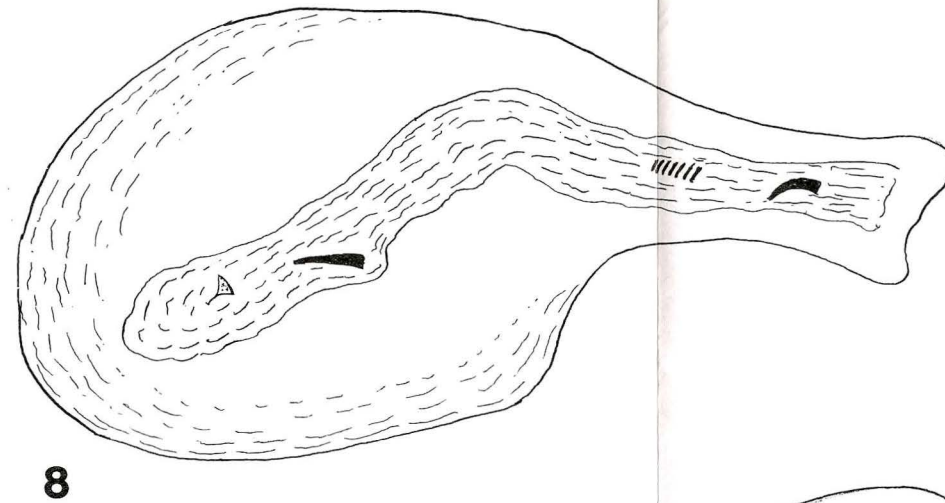
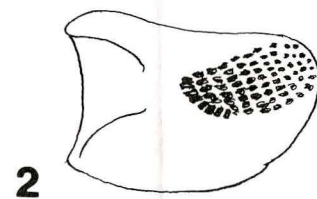
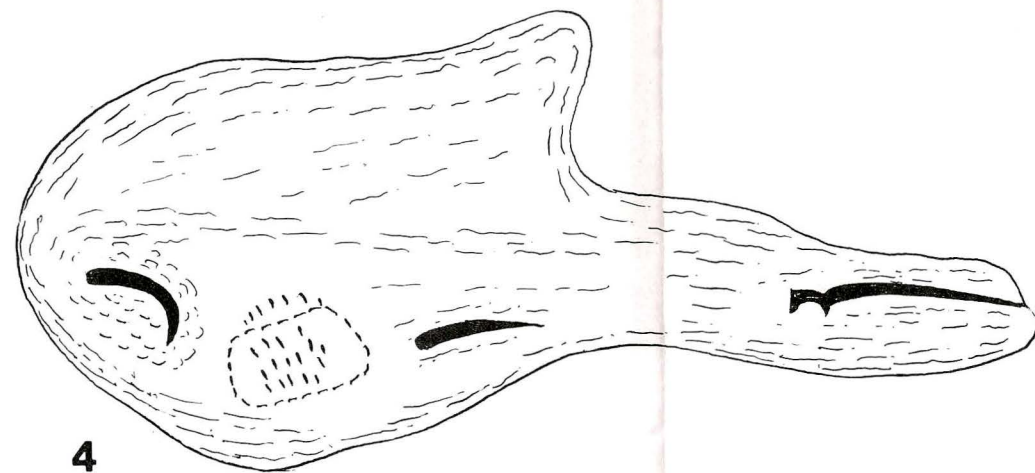
figs. 6-8. Genitalia of *Sortosa nomugiensis* sp. nov.
6. Lateral aspect, 7. Dorsal aspect of tenth segment, 8. Aedeagus.



Pl. 5.

- figs. 1-3. *Sortosa commata* sp. nov.
 1. Lateral aspect, 2. Dorsal aspect of tenth segment, 3. Aedeagus.
 figs. 4-7. *Wormaldia uonumana* sp. nov.
 4. Lateral aspect of genitalia, 5. Ventral process of seventh segment, 6. Dorsal aspect of tenth segment, 7. Aedeagus.
 figs. 8-11. *Wormaldia yunotakiensis* sp. nov.
 8. Lateral aspect of genitalia, 9. Dorsal aspect of apical segment of clasper, 10. Dorsal aspect of tenth segment, 11. Aedeagus.





Pl. 6.

figs. 1-4. *Wormaldia saekiensis* sp. nov.

1. Lateral aspect of genitalia, 2. Dorsal aspect of apical segment of clasper, 3. Dorsal aspect of tenth segment, 4. Aedeagus.

figs. 5-8. *Wormaldia kurokawanus* KOBAYASHI

5. Lateral aspect of genitalia, 6. Dorsal aspect of apical segment of clasper, 7. Dorsal aspect of tenth segment, 8. Aedeagus.

Pl. 7.

figs. 1-3. *Wormaldia nabewarinus* KOBAYASHI

1. Lateral aspect of genitalia, 2. Dorsal aspect of tenth segment, 3. Aedeagus.

figs. 4-6. *Wormaldia sumuharana* sp. nov.

4. Lateral aspect of genitalia, 5. Dorsal aspect of tenth segment, 6. Aedeagus.

figs. 7-8. *Wormaldia rarus* KOBAYASHI

7. Lateral aspect of genitalia, 8. Dorsal aspect of tenth segment

